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## Oluwaseyi Oluwabi

Wissenschaftlicher Mitarbeiter,
Lehrstuhl Werkstoffwissenschaft

Ruhr-Universität Bochum


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# Martensitic transformations and atomic mobilities in NiTi-based shape memory alloys


Our research focuses on investigating martensitic transformation and chemical interdiffusion in high entropy shape memory alloys (HE-SMAs) and related subsystems. HE-SMAs exhibit reversible martensitic transformations at elevated temperatures. They can be established by incorporating elements such as Cu, Pd, Hf, and Zr into binary Ni-Ti alloys. In this study, we introduce a novel approach for alloy screening by utilizing binary diffusion couples (DCs) and in-situ cooling in the scanning electron microscope (SEM). Through our experiments, we have made two key observations. Firstly, we have obtained new results on how microstructures with chemical gradients affect martensitic transformations. Secondly, the same diffusion couple technique allows to investigate interdiffusion in SMAs with different compositions. We have found that the presence of Pd in the B2 phase accelerates Ni/Ti interdiffusion, while Hf and Zr have the opposite effect. As a dominant trend, off-stoichiometric compositions exhibit the fastest interdiffusion rates. This finding suggests that structural vacancies may exist in these types of SMAs. In contrast, lower interdiffusion rates were determined for stoichiometric SMAs, no matter whether atomic transport occurred in the Ni- or Ti-sublattice.



1 Oluwabi, O.O., 2 Frenzel, J., 3 Eggeler, G.